



Europa Lander Mission Concept

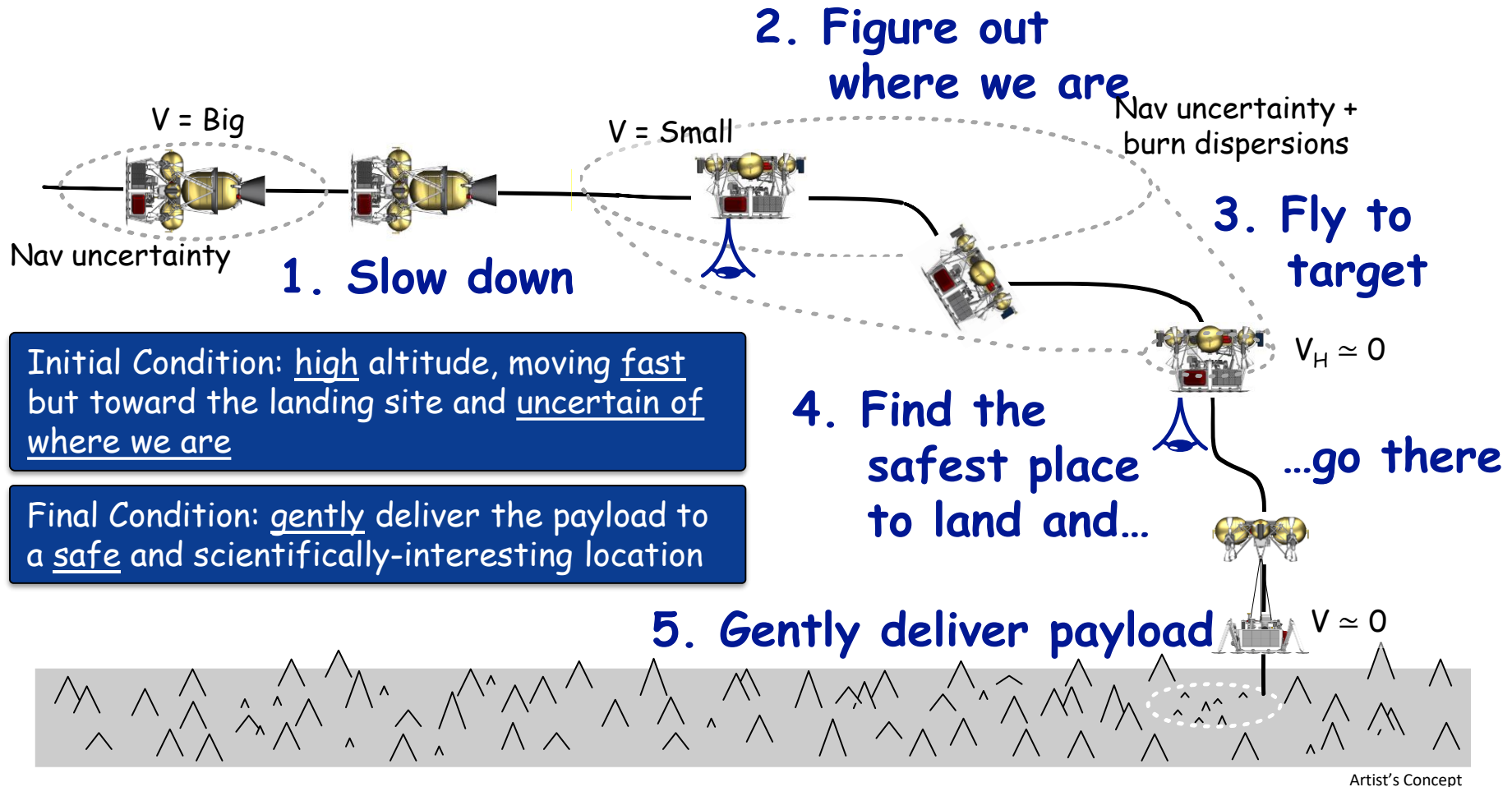
Intelligent Landing System (ILS)

Nikolas Trawny and the Europa Lander ILS/GNC/DDL team

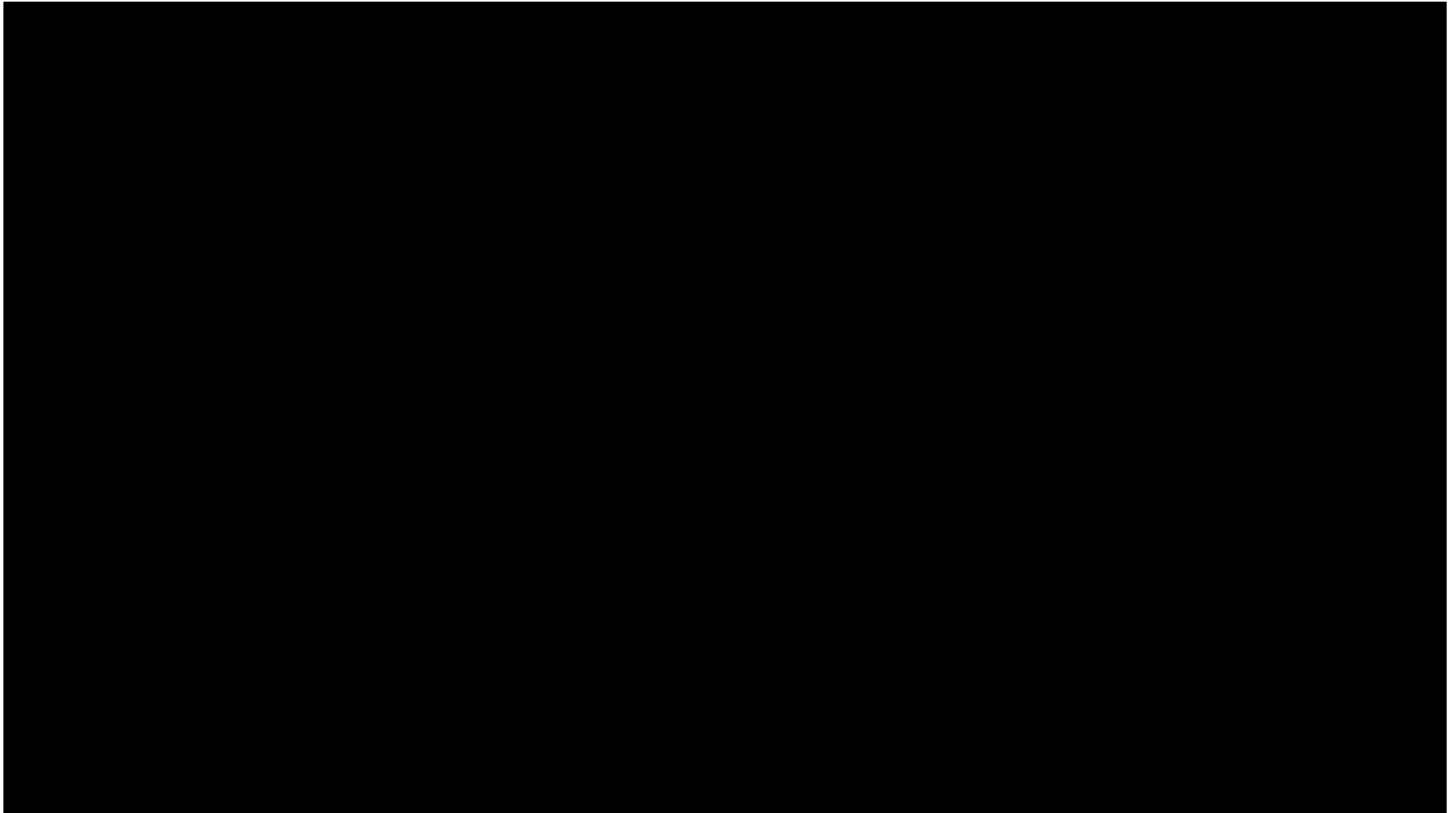
Jet Propulsion Laboratory, California Institute of Technology

Outer Planets Assessment Group (OPAG) Technology Forum, 23. February 2018

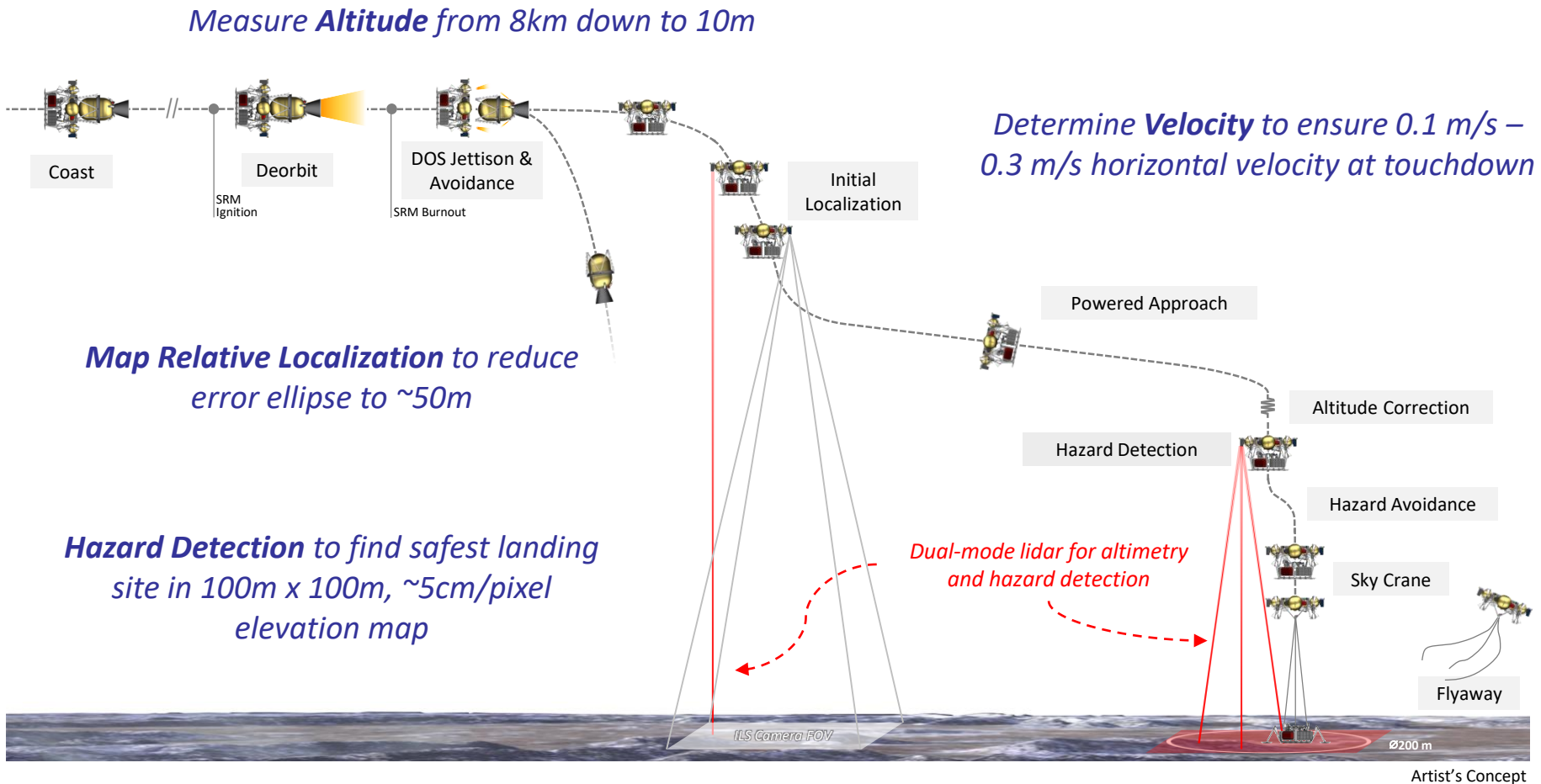
How (We Plan) To Land on Europa



Europa Deorbit, Descent, and Landing High Fidelity Dynamics Simulation



Intelligent Landing System Capabilities

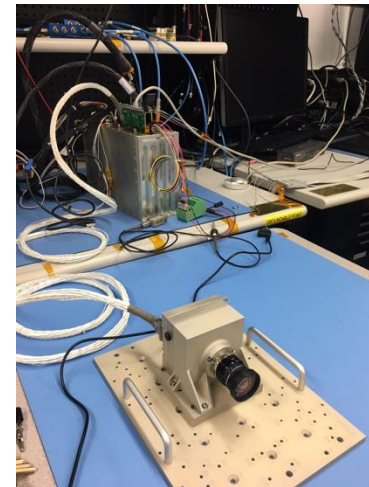


Map Relative Localization

- Map Relative Localization baselined on Mars 2020
 - ILS leverages Mars 2020 software, firmware, hardware, and simulation development
- Issued Request For Proposals for multi-phase competitive technology development for ILS camera
- Captive carry ILS field test planned for 2019



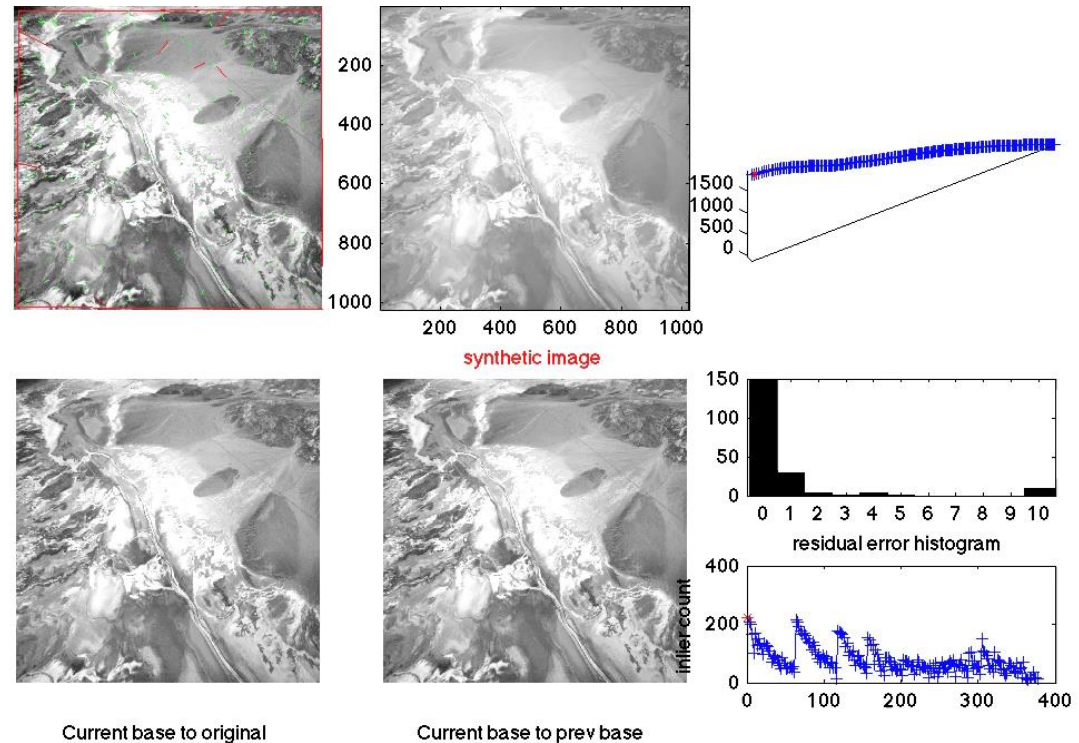
Helicopter and Rocket Field Test Campaign 2014



Mars 2020 Lander Vision System
Engineering Development Unit

Velocity Measurements

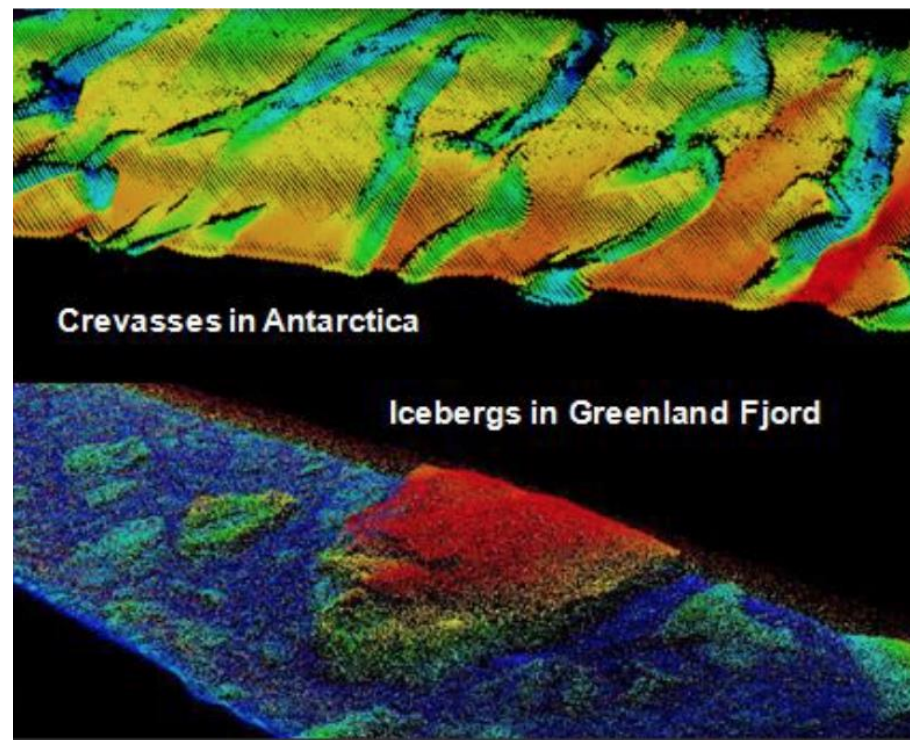
- Velocity measured using image-to-image visual feature tracking (visual odometry)
- Proof-of-concept demonstration on helicopter field test and laboratory wall
- Nov 2018 planned drop test with representative final descent trajectory



2014 Helicopter Field Test

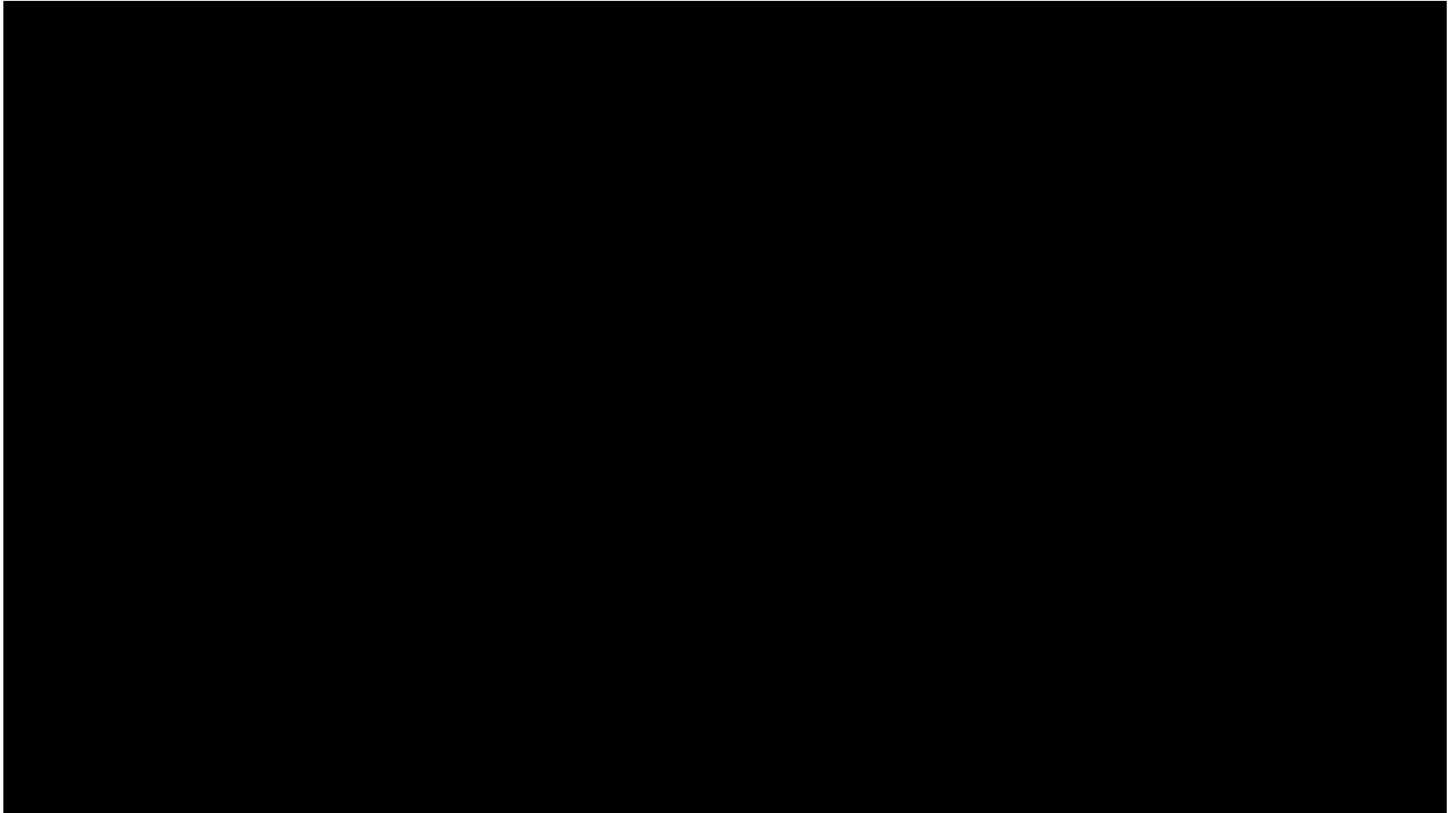
Hazard Detection / Altimetry

- Enabled by dual-mode LIDAR
- Started 3-phase LIDAR technology development in Jan 2018
- Goal: minimize flight development risk prior to PDR
- 3 Partners
 - Sigma Space Corp.
 - MIT Lincoln Laboratory
 - NASA Goddard Spaceflight Center



3D maps of icy surfaces produced by photon counting LIDAR
[J. Degnan, C. Field, "Moderate to high altitude, single photon sensitive, 3D imaging lidars," Proc. SPIE 9114]

Questions?





Jet Propulsion Laboratory
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